[JP,2541182,B]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

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(57) [Claim(s)]
[Claim 1] A motor 2 to 1 side at the side else The front head 32 and the rear head 33, Have cylinder room 31a which carries out the interior of the roller 34, and the compression element 3 which consists of the cylinder 31 which supported the blade 35 in contact with said roller 34 to reciprocation freedom is arranged. Are the rotary compressor which fitted in said roller 34 the eccentric section 41 of the driving shaft 4 prolonged from said motor 2, and it centers on the location displaced [of this eccentric section 41] from eccentricity 90 degrees to the anti-hand of cut of this driving shaft 4 at said eccentric section 41. The rotary compressor which forms the contraction sliding section 43 to which the shaft-orientations width of face of said roller 34 inner skin of said eccentric section 41 and the sliding surface 42 which slides is made to reduce within the limits of at least 90 degrees in both hands of cut, respectively.
[Claim 2] The rotary compressor according to claim 1 with which the shaft-orientations width of face forms narrowly the contraction sliding section 43 in the sliding surface 42 of the eccentric section 41 in the anti-hand of cut of a driving shaft 4 one by one toward the location displaced 90 degrees from eccentricity.
[Claim 3] The rotary compressor according to claim 1 which forms the contraction sliding section 43 in the sliding surface 42 of the eccentric section 41 so that it may be located in the shaft-orientations mid gear of this roller 34 at the time of fit-in on said roller 34 of said eccentric section 41.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention arranges in 1 side the compression element which carried out the interior of the roller for the motor to the cylinder room at the side else, and relates to the rotary compressor which fitted in the eccentric section of the driving shaft prolonged from said motor on said roller.
[0002]
[Description of the Prior Art] As it is indicated by JP,63-71591,A and is conventionally shown in drawing 7 as this kind of a rotary compressor, for example Motor M to the 1 side in the sealing casing C at the side else The front head FH and the rear head RH It has the cylinder room S1 which carries out the interior of the roller R, the compression element CF which consists of the cylinder S which supported the blade B in contact with said roller R to reciprocation freedom is arranged, and what fitted in the eccentric section P of the driving shaft K prolonged from said motor M on said roller R is known.
[0003]
[Problem(s) to be Solved by the Invention] However, in the conventional rotary compressor, the peripheral face P1 of said eccentric section P of this driving shaft K and the inner skin R1 of said roller R slide by rotation of said driving shaft K, and there is a problem to which mechanical loss is large, that is, power loss of a motor becomes large by viscous shear loss of the oil in this sliding surface. Then, although it is possible to make small sliding area with the inner skin R1 of said roller R, and to make viscous shear loss of an oil small by making small width of face of the shaft orientations of the peripheral face P1 of said eccentric section P If this sliding area is made small, the minimum oil film thickness of the oil film formed on the contrary between the peripheral face P1 of said eccentric section P and the inner skin R1 of said roller R will decrease, and wear and baking will produce poor lubrication between a lifting, and said peripheral face P1 and inner skin R1.
[0004] When said eccentric section P is fitted in said roller R and it is made to rotate in said cylinder room S1, namely, to the peripheral face of said roller R Force, such as contact pressure by the pressure of a refrigerant gas and the point of Blade B which were compressed carrying out a pressure welding to the peripheral face of said roller R, is applied. Although the thickness in the part which this load concentrates becomes the thinnest, the thickness of the oil film which this load will be received by some peripheral faces P1 of said eccentric section P which countered this load, and it is supplied with oil in said roller R, and is formed between said peripheral faces P1 and inner skin R1 This minimum oil film thickness by the flow of the oil produced by rotation of said driving shaft K The pressure to said roller R of this oil film arises, this oil film pressure and force, such as said contact pressure, balance, and said oil film thickness is decided by the force in which this oil tends to enter into the minimum clearance part of said peripheral face P1 and inner skin R1. However, since said oil film pressure and force, such as said contact pressure, are made to balance when width of face of the peripheral face P1 of said eccentric section P is made small, in order to make said viscous shear loss small, said oil film thickness will become thin, the lubrication between said peripheral faces P1 and inner skin R1 will become inadequate, and the wear and baking by sliding will arise.
[0005] This invention also aims the lubrication between this peripheral face and inner skin at offering the rotary compressor which can be performed enough, making small viscous shear loss of the oil in the sliding surface of the peripheral face of the eccentric section, and roller inner skin, and being able to reduce mechanical loss.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention a motor 2 to 1 side at the side else The front head 32 and the rear head 33, Have

cylinder room 31a which carries out the interior of the roller 34, and the compression element 3 which consists of the cylinder 31 which supported the blade 35 in contact with said roller 34 to reciprocation freedom is arranged. In the rotary compressor which fitted in said roller 34 the eccentric section 41 of the driving shaft 4 prolonged from said motor 2 In said eccentric section 41, it sets [of this eccentric section 41] within the limits of at least 90 degrees from eccentricity in both hands of cut, respectively centering on the location displaced 90 degrees to the anti-hand of cut of this driving shaft 4. The contraction sliding section 43 to which the shaft-orientations width of face of said roller 34 inner skin of said eccentric section 41 and the sliding surface 42 which slides is made to reduce was formed.
[0007] Moreover, it is desirable that the shaft-orientations width of face forms narrowly the contraction sliding section 43 in the sliding surface 42 of said eccentric section 41 in the anti-hand of cut of a driving shaft 4 one by one toward the location displaced 90 degrees from eccentricity.
[0008] Moreover, it is desirable to form the contraction sliding section 43 in the sliding surface 42 of said eccentric section 41 so that it may be located in the shaft-orientations mid gear of this roller 34 at the time of fit-in on said roller 34 of said eccentric section 41.
[0009]
[Function] Since said contraction sliding section 43 is formed in the anti-load side range in case the above mentioned range, i.e., the load which acts on a sliding surface 42, serves as max and it does not form in a load side, it sets at the time of rotation of said driving shaft 4. In a load side with many amounts of loads in case the load to this sliding surface 42 serves as max among the sliding surfaces 42 in the eccentric section 41 of this driving shaft 4 Since sufficient sliding area which can bear the load corresponding to gas pressure and the contact pressure of a blade is secured and the oil film thickness between the sliding surface 42 by the side of a load with many this amount of loads and the inner skin of said roller 34 is secured enough, wear by this sliding and printing are prevented. And since said contraction sliding section 43 was formed in the anti-load side with few amounts of loads in case a load serves as max among said sliding surfaces 42, said sliding area is reduced by this contraction sliding section 43, and viscous shear loss of the oil in the sliding surface of said sliding surface 42 and inner skin of said roller 34 can be made small. Therefore, the problem by poor lubrication is also solvable as a whole, also being able to reduce the mechanical loss at the time of rotation of said driving shaft 4.
[0010] Moreover, by forming the contraction sliding section 43 in the sliding surface 42 of the eccentric section 41 so that it may be located in the shaft-orientations mid gear of this roller 34 at the time of fit-in on said roller 34 of said eccentric section 41 Since the measure point is made in the center of shaft orientations even if it forms said contraction sliding section 43 in case a backlash does not arise even if it fits said eccentric section 41 in said roller 34, and the outer diameter of this eccentric section 41 is measured When said sliding surface 42 inclines in the range of the error of formation, the error of an overall diameter which it is with an overall diameter and measured value since the average will be measured mostly is small suppressed as the diameter of min, and the engine performance and dependability are maintained as usual.
[0011] Moreover, since sequential sliding area is reduced towards an anti-load side when the shaft-orientations width of face forms narrowly the contraction sliding section 43 in the sliding surface 42 of the eccentric section 41 in the anti-hand of cut of a driving shaft 4 one by one toward the location displaced 90 degrees from eccentricity, in case a load serves as max, the viscous shear loss by the oil of said eccentric section 41 is reduced more effectively. Furthermore, by forming narrowly the shaft-orientations width of face of said contraction sliding section 43 one by one Since the inclined plane which inclines toward the core of said contraction sliding section 43 will be formed in the shaft-orientations edge of this eccentric section 41 and an oil can be centralized on the part of the minimum width of face of this

contraction sliding section 43 along this inclined plane Even if the area of a sliding surface 42 becomes small in said contraction sliding section 43, a load takes for this contraction sliding section 43 forward and backward at the time of initiation of a pressing operation, oil film thickness becomes thin and it becomes easy to produce the lack of an oil Sufficient oil supply for this sliding section is carried out, the lack of an oil in this part is prevented, and dependability improves.

[0012]

[Example] Hereafter, one example of the rotary compressor concerning this invention is explained based on a drawing. The rotary compressor shown in drawing 1 carries out the interior of the motor 2 which changes from Rota 21 and a stator 22 to the upper part of the sealing casing 1 which prepared sump 1a in the pars basilaris ossis occipitalis. In the lower part location of this motor 2 A cylinder 31, While carrying out the interior of the compression element 3 which consists of the front head 32 and the rear head 33 which are arranged in the vertical location of this cylinder 31 The bearings 32a and 33a prolonged in the vertical direction on said front head 32 and the rear head 33 are formed, and the roller 34 is fitted in the eccentric section 41 of this driving shaft 4, while carrying out bearing support of the driving shaft 4 at each [these] bearings 32a and 33a and connecting the upper limit of this driving shaft 4 with said motor 2.

[0013] Moreover, while preparing inhalation hole 31b which inhales a low-pressure gas refrigerant to cylinder room 31a in said cylinder 31 A point contacts said roller 34 and the interior of the blade 35 which slides possible [an attitude] is carried out. On said front head 32 While preparing the discharge opening (not shown) in which a compressed-gas refrigerant carries out the regurgitation, the regurgitation muffler 5 is attached. Form the regurgitation chamber 51 by this regurgitation muffler 5, and a low-pressure gas refrigerant is inhaled in said cylinder room 31a from said inhalation hole 31b by rotation of said roller 34 accompanying the rotation drive of said motor 2. This inhaled gas refrigerant is compressed by rotation of said roller 34, and he makes the compressed gas refrigerant breathe out in said regurgitation chamber 51 from said discharge opening, and is trying to make it breathe out from this regurgitation chamber 51 to the primary regurgitation space 6 in casing 1.

[0014] This invention formed [thus / of this eccentric section 41] the contraction sliding section 43 to which the shaft-orientations width of face of said roller 34 inner skin of said eccentric section 41 and the sliding surface 42 which slides is made to reduce within the limits of at least 90 degrees from eccentricity in the rotary compressor explained above in both hands of cut at said eccentric section 41, respectively centering on the location displaced 90 degrees to the anti-hand of cut of this driving shaft 4.

[0015] That is, the shaft-orientations width of face of a sliding surface 42 which becomes an anti-load side to a side with many amounts of loads in case a load serves as max among the sliding sections which receive a load with the refrigerant gas into which the sliding surface 42 with said roller 34 of said eccentric section 41 was compressed at the time of rotation of said driving shaft 4, the pressure welding of said blade 35, etc. is made to reduce, and the contraction sliding section 43 is formed. That is, the load which the sliding surface 42 of said this eccentric section 41 receives As the thick wire arrow head showed to drawing 4 , the magnitude and the direction of the load change with angle of rotation of the eccentric section 41. In drawing 4 The die length and the direction of an arrow head show the magnitude and the direction of each load of [when the eccentric direction of this eccentric section 41 makes the point of said blade 35 the starting point and 45 degrees of said eccentric sections 41 in said cylinder room 31a rotate at a time]. Therefore, it is based on the location where the eccentric direction location of the eccentric section 41 has countered the blade 35 a passage clearer than this drawing 4 . Although it is the range of the eccentric direction location and the location which exceeded 90 degrees to the anti-hand of cut to this eccentric direction location that said sliding surface 42 receives a load from this 0 degree in 90 degrees when

this location is made into 0 degree In this range, since the inhalation phase and the pressing operation were just started, the load which the sliding surface 42 of this eccentric section 41 receives is small. Moreover, to the eccentric direction, to 90-degree location to the eccentric direction location of an anti-hand of cut, a phase changes to a hand-of-cut location to the eccentric direction through the anti-eccentricity direction location which has shifted, and, as for the sliding surface 42 which receives a load in 90 degrees to 180 degrees, a load also increases with a compressive advance about 180 degrees. And just before the location of 225 degrees, i.e., a discharge valve, opens and the regurgitation is started, a load serves as max, and this load will act centering on the location displaced from eccentricity 90 degrees to the hand of cut in said sliding surface 42.

[0016] This invention makes area of a sliding surface 42 small in the small field of a load paying attention to the magnitude of the load which the sliding surface 42 of said eccentric section 41 receives as mentioned above differing in the rotation location thus.

[0017] If an arrow head A specifically shows the eccentric direction of said eccentric section 41 as shown in drawing 2 and drawing 3 The location displaced 90 degrees to the hand of cut of said driving shaft 4 turns into [this / A] a load side location when a load becomes max from eccentricity, and it centers on the location a conversely displaced 90 degrees to the anti-hand of cut. The range of at least 90 degrees becomes both hands of cut an anti-load side when a load becomes max, respectively. Therefore, the falcation steps 43a and 43a were formed in the shaft-orientations both ends of said eccentric section 41 within the limits of this, and said contraction sliding section 43 which makes said sliding surface 42 reduce to shaft-orientations width of face was formed so that the shaft-orientations mid gear of this roller 34 might be countered at the shaft-orientations mid gear of said eccentric section 41, at i.e., the time of fit-in on said roller 34.

[0018] In a load side in case the amount of loads of the sliding surface 42 of the eccentric section 41 of this driving shaft 4 serves as max by ****(ing) at the time of rotation of said driving shaft 4 Since sufficient sliding area which can bear this load is secured and the oil film thickness between the sliding surface 42 with many this amount of loads and the inner skin of said roller 34 can be secured enough In an anti-load side with few amounts of loads of said sliding surface 42 with little effect of the ability to prevent wear by this sliding, and printing, and to be worn out and burned moreover Since said sliding area is made to reduce by forming said contraction sliding section 43 and viscous shear loss of the oil in the sliding surface of said sliding surface 42 and inner skin of said roller 34 can be made small The problem by poor lubrication is also solvable, also being able to reduce the mechanical loss at the time of rotation of said driving shaft 4 as a whole.

[0019] As mentioned above, the rotary compressor of this invention The poor lubrication between the inner skin of said roller 34 by securing the area of the sliding surface 42 of said eccentric section 41 to a load side in case the amount of loads in the sliding surface 42 of said eccentric section 41 serves as max, and oil film thickness becoming thin is prevented. By forming said contraction sliding section 43 in an anti-load side in case the amount of loads serves as max moreover, and making the sliding area by the side of this anti-load reduce, being able to prevent wear by poor lubrication, and printing The mechanical loss at the time of rotation of said driving shaft 4 can also be reduced without poor lubrication arising, since viscous shear loss of the oil in the sliding surface of said sliding surface 42 and inner skin of said roller 34 was made small.

[0020] Moreover, since said contraction sliding section 43 is located in the shaft-orientations center section of said sliding surface 42 in said example so that the mid gear of this roller **** may be countered at the time of fit-in on said roller 34 Since the measure point is made in the center of shaft orientations even if it forms said contraction sliding section 43 in case a backlash does not arise even if it fits in said roller 34, and the outer diameter of said eccentric section 41 is measured When said sliding surface 42 inclines in the range of the error of

formation, the error of an overall diameter which it is with an overall diameter and measured value since the average can be measured mostly can be small suppressed as the diameter of min, and the engine performance and dependability can be maintained as usual. In addition, although the formation location of said contraction sliding section 43 has a desirable shaft-orientations center section, it may be formed in the location of not only this center section but arbitration.

[0021] Next, other examples of said contraction contact section 43 are explained based on drawing 5 and drawing 6 . Drawing 5 is drawing which saw said contraction sliding section 43 formed in said eccentric section 42 from the transverse plane. Drawing 6 It is drawing which saw the contraction sliding section 43 of drawing 5 from X. This example The shaft-orientations width of face forms said contraction sliding section 43 in the anti-hand of cut of said driving shaft 4 narrowly one by one toward the location displaced 90 degrees, i.e., a location shown in drawing 2 , from eccentricity, and it is formed so that the shaft-orientations width of face in these a locations may turn into the minimum width of face. Although step 43a is specifically formed in said eccentric section 42 in order to form said contraction sliding section 43 When beveling after forming this step 43a, it bevels so that it may become the minimum width of face in said a location to the shaft-orientations both ends of said contraction sliding section 43, and it forms so that the shaft-orientations width of face in the core (the above mentioned a location) of said contraction sliding section 43 may serve as min. Since sequential sliding area is reducible towards an anti-load side, i.e., said a location, in case the amount of loads in said sliding surface 42 serves as max by ****(ing), ****** shear loss can be more effectively reduced to oil of said eccentric section 41. Furthermore, although oil film thickness decreases and it becomes easy to produce the lack of lubrication when sliding area becomes small, although the load received in this maximum small section in said contraction sliding section 43 becomes the load side of a load in the include-angle range of about 45 degrees shown in drawing 4 and the amount of loads is comparatively small Since it is made the configuration made sequential narrow [which described above said contraction sliding section 43] Since an oil can be centralized on the core used as the minimum width of face of said contraction sliding section 43 along the inclined plane produced with this narrow configuration, sufficient oil supply for this sliding section can be performed, the lack of an oil in this part can be prevented, and dependability can be improved so much. Moreover, since said inclined plane is processed by beveling processing, the formation is easy and can set up shaft-orientations width of face freely corresponding to various bearing loads.

[0022]

[Effect of the Invention] The rotary compressor of this invention is set [of this eccentric section 41] within the limits of at least 90 degrees from eccentricity in said eccentric section 41 in both hands of cut, respectively centering on the location displaced 90 degrees to the anti-hand of cut of this driving shaft 4. Since the contraction sliding section 43 to which the shaft-orientations width of face of said roller 34 inner skin of said eccentric section 41 and the sliding surface 42 which slides is made to reduce was formed, it sets at the time of rotation of said driving shaft 4. In a load side in case the amount of loads in the sliding surface 42 of the eccentric section 41 of this driving shaft 4 serves as max Since sufficient sliding area which can bear this load is secured and the oil film thickness between the sliding surface 42 with many this amount of loads and the inner skin of said roller 34 can be secured enough In an anti-load side in case wear by this sliding and printing can be prevented and the amount of loads in said sliding surface 42 moreover serves as max by said contraction sliding section 43 Since said sliding area is made to reduce and viscous shear loss of the oil in the sliding surface of said sliding surface 42 and inner skin of said roller 34 can be made small, it can decrease without the problem of poor lubrication producing the mechanical loss at the time of rotation of said driving shaft 4.

[0023] Moreover, by forming the contraction sliding section 43 in the sliding surface 42 of

the eccentric section 41 so that it may be located in the shaft-orientations mid gear of this roller 34 at the time of fit-in on said roller 34 of said eccentric section 41 Since the measure point is made in the center of shaft orientations even if it forms said contraction sliding section 43 in case a backlash does not arise even if it fits said eccentric section 41 in said roller 34, and the outer diameter of this eccentric section 41 is measured When said sliding surface 42 inclines in the range of the error of formation, the error of an overall diameter which it is with an overall diameter and measured value since the average can be measured mostly can be small suppressed as the diameter of min, and the engine performance and dependability can be maintained as usual.

[0024] Moreover, when the shaft-orientations width of face forms narrowly the contraction sliding section 43 in the sliding surface 42 of the eccentric section 41 in the anti-hand of cut of a driving shaft 4 one by one toward the location displaced 90 degrees from eccentricity Since the inclined plane which inclines toward the core of said contraction sliding section 43 can be formed in the shaft-orientations edge of this eccentric section 41 and an oil can be centralized on the part of the minimum width of face of this contraction sliding section 43 along this inclined plane Even if the area of a sliding surface 42 becomes small in said contraction sliding section 43, a load takes for this contraction sliding section 43 forward and backward at the time of initiation of a pressing operation, oil film thickness becomes thin and it becomes easy to produce the lack of an oil Sufficient oil supply for this sliding section can be performed, the lack of an oil in this part can be prevented, and dependability can be improved.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing of longitudinal section of the rotary compressor of this invention.
[Drawing 2] The expansion cross-sectional view of the cylinder in the rotary compressor of this invention.
[Drawing 3] The perspective view of the eccentric section of the driving shaft in this invention.
[Drawing 4] The operation explanatory view of the load concerning the eccentric section of the driving shaft in a cylinder.
[Drawing 5] The expansion front view of the eccentric section showing other examples.
[Drawing 6] The expansion side elevation which saw the eccentric section of drawing 5 from X.
[Drawing 7] The sectional view showing the conventional example.
[Description of Notations]
2 Motor
3 Compression Element

31 Cylinder
31a Cylinder room
32 Front Head
33 Rear Head
34 Roller
4 Driving Shaft
41 Eccentric Section
42 Sliding Surface
43 Contraction Sliding Section

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(54)【発明の名称】　ロータリー圧縮機

(57)【特許請求の範囲】

【請求項１】一側にモータ２を、他側にフロントヘッド３２及びリヤヘッド３３と、ローラ３４を内装するシリンダ室３１ａをもち、前記ローラ３４に接触するブレード３５を往復動自由に支持したシリンダ３１とから成る圧縮要素３を配設して、前記ローラ３４に前記モータ２から延びる駆動軸４の偏心部４１を挿嵌したロータリー圧縮機であって、前記偏心部４１に、該偏心部４１の偏心方向から該駆動軸４の反回転方向に９０°変位した位置を中心として、両回転方向にそれぞれ少なくとも９０°の範囲内において、前記偏心部４１の前記ローラ３４内周面と摺動する摺動面４２の軸方向幅を縮小させる縮小摺動部４３を形成しているロータリー圧縮機。

【請求項２】偏心部４１の摺動面４２における縮小摺動部４３を、その軸方向幅が偏心方向から駆動軸４の反回転方向に９０°変位した位置に向かって順次狭く形成している請求項１記載のロータリー圧縮機。

【請求項３】偏心部４１の摺動面４２における縮小摺動部４３を、前記偏心部４１の前記ローラ３４への挿嵌時に、該ローラ３４の軸方向中央位置に位置するように形成している請求項１記載のロータリー圧縮機。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、一側にモータを、他側にシリンダ室にローラを内装した圧縮要素を配設して、前記ローラに前記モータから延びる駆動軸の偏心部を挿嵌したロータリー圧縮機に関する。

【０００２】

【従来の技術】従来、この種のロータリー圧縮機としては、例えば、特開昭６３－７１５９１号公報に記載さ

れ、また、図７に示すように、密閉ケーシングＣ内の一側にモータＭを、他側にフロントヘッドＦＨ及びリヤヘッドＲＨと、ローラＲを内装するシリンダ室Ｓ１をもち、前記ローラＲに接触するブレードＢを往復動自由に支持したシリンダＳとから成る圧縮要素ＣＦを配設して、前記ローラＲに前記モータＭから延びる駆動軸Ｋの偏心部Ｐを挿嵌をしたものが知られている。

【０００３】

【発明が解決しようとする課題】しかしながら、従来のロータリー圧縮機では、前記駆動軸Ｋの回転により該駆動軸Ｋの前記偏心部Ｐの外周面Ｐ１と前記ローラＲの内周面Ｒ１とが摺動し、この摺動面における油の粘性せん断損失により機械損失が大きく、つまり、モータの動力損失が大きくなる問題がある。そこで、前記偏心部Ｐの外周面Ｐ１の軸方向の幅を小さくすることにより、前記ローラＲの内周面Ｒ１との摺動面積を小さくして、油の粘性せん断損失を小さくすることが考えられるが、この摺動面積を小さくすると、反対に前記偏心部Ｐの外周面Ｐ１と前記ローラＲの内周面Ｒ１との間に形成される油膜の最小油膜厚さが減って、潤滑不良を起こし、前記外周面Ｐ１と内周面Ｒ１との間で摩耗・焼き付けが生じてしまうのである。

【０００４】即ち、前記偏心部Ｐを前記ローラＲに挿嵌して、前記シリンダ室Ｓ１内で回転させたとき、前記ローラＲの外周面には、圧縮された冷媒ガスの圧力やブレードＢの先端部が前記ローラＲの外周面に圧接することによる圧接力などの力が掛かり、この荷重に対向した前記偏心部Ｐの一部の外周面Ｐ１でこの荷重を受けることになるのであり、また、前記ローラＲ内に給油されて前記外周面Ｐ１と内周面Ｒ１との間に形成される油膜の厚さは、この荷重が集中する部分においての膜厚が一番薄くなるのであるが、この最小油膜厚は、前記駆動軸Ｋの回転によって生じる油の流れによって、この油が前記外周面Ｐ１と内周面Ｒ１との最小隙間部分に入り込もうとする力により、該油膜の前記ローラＲに対する圧力が生じ、この油膜圧力と前記圧接力などの力とがバランスして、前記油膜厚が決まるのである。しかしながら、前記粘性せん断損失を小さくするために前記偏心部Ｐの外周面Ｐ１の幅を小さくすると、前記油膜圧力と前記圧接力などの力とをバランスさせるために、前記油膜厚が薄くなり、前記外周面Ｐ１と内周面Ｒ１との間の潤滑が不十分となり摺動による摩耗や焼き付けが生じてしまうのである。

【０００５】本発明は、偏心部の外周面とローラ内周面との摺動面における油の粘性せん断損失を小さくして、機械損失を低減できながら、該外周面と内周面との間の潤滑も十分行えるロータリー圧縮機を提供することを目的とする。

【０００６】

【課題を解決するための手段】本発明は、上記目的を達

成するために、一側にモータ２を、他側にフロントヘッド３２及びリヤヘッド３３と、ローラ３４を内装するシリンダ室３１ａをもち、前記ローラ３４に接触するブレード３５を往復動自由に支持したシリンダ３１とから成る圧縮要素３を配設して、前記ローラ３４に前記モータ２から延びる駆動軸４の偏心部４１を挿嵌したロータリー圧縮機において、前記偏心部４１に、該偏心部４１の偏心方向から該駆動軸４の反回転方向に９０°変位した位置を中心として、両回転方向にそれぞれ少なくとも９０°の範囲内において、前記偏心部４１の前記ローラ３４内周面と摺動する摺動面４２の軸方向幅を縮小させる縮小摺動部４３を形成したのである。

【０００７】また、前記偏心部４１の摺動面４２における縮小摺動部４３を、その軸方向幅が偏心方向から駆動軸４の反回転方向に９０°変位した位置に向かって順次狭く形成することが好ましい。

【０００８】また、前記偏心部４１の摺動面４２における縮小摺動部４３を、前記偏心部４１の前記ローラ３４への挿嵌時に、該ローラ３４の軸方向中央位置に位置するように形成することが好ましい。

【０００９】

【作用】前記縮小摺動部４３は、前記した範囲、つまり、摺動面４２に作用する荷重が最大となるときの反負荷側範囲に形成し、負荷側には形成していないから、前記駆動軸４の回転時において、該駆動軸４の偏心部４１における摺動面４２のうち、該摺動面４２への荷重が最大となるときの荷重量の多い負荷側においては、ガス圧力及びブレードの圧接力に対応する荷重に耐えうるだけの十分な摺動面積が確保され、この荷重量の多い負荷側の摺動面４２と前記ローラ３４の内周面との間の油膜厚が十分確保されるので、この摺動による摩耗、焼付けが防止される。しかも、前記摺動面４２のうち、荷重が最大となるときの荷重量の少ない反負荷側において前記縮小摺動部４３を設けたから、この縮小摺動部４３により、前記摺動面積が縮小されて、前記摺動面４２と前記ローラ３４の内周面との摺動面における油の粘性せん断損失を小さくできるのである。従って、全体として、前記駆動軸４の回転時の、機械損失も低減できながら、潤滑不良による問題も解消できるのである。

【００１０】また、偏心部４１の摺動面４２における縮小摺動部４３を、前記偏心部４１の前記ローラ３４への挿嵌時に、該ローラ３４の軸方向中央位置に位置するように形成することにより、前記ローラ３４に前記偏心部４１を挿嵌してもガタツキが生じないし、該偏心部４１の外径を測定する際、前記縮小摺動部４３を形成していても、その測定ポイントを軸方向中央にできるので、前記摺動面４２が形成の誤差の範囲で傾斜している場合、最小径と最大径のほぼ平均値が測定されることになるので、最大径と測定値との誤差が小さく抑えられ、性能、信頼性が従来通り維持されるのである。

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【００１１】また、偏心部４１の摺動面４２における縮小摺動部４３を、その軸方向幅が偏心方向から駆動軸４の反回転方向に９０°変位した位置に向かって順次狭く形成することにより、荷重が最大となるときの反負荷側に向けて順次摺動面積が縮小されるので、前記偏心部４１の油による粘性せん断損失がより効果的に低減されるのである。さらに、前記縮小摺動部４３の軸方向幅を順次狭く形成することにより、この偏心部４１の軸方向端部に前記縮小摺動部４３の中心部に向かって傾斜する傾斜面が形成されることになり、該縮小摺動部４３の最小幅の部分にこの傾斜面に沿って油を集中させることができるので、前記縮小摺動部４３において摺動面４２の面積が小さくなり、圧縮工程の開始時前後においてこの縮小摺動部４３に負荷が掛かって油膜厚が薄くなって油不足が生じ易くなっても、この摺動部に十分な給油がされ、この部分における油不足が防止され、信頼性が向上されるのである。

【００１２】

【実施例】以下、本発明にかかるロータリー圧縮機の一実施例を図面に基づいて説明する。図１に示すロータリー圧縮機は、底部に油溜め１ａを設けた密閉ケーシング１の上部にロータ２１とステータ２２とから成るモータ２を内装し、かつ、該モータ２の下方位置に、シリンダ３１と、該シリンダ３１の上下位置に配設するフロントヘッド３２及びリヤヘッド３３とから成る圧縮要素３を内装すると共に、前記フロントヘッド３２及びリヤヘッド３３に上下方向に延びる軸受部３２ａ，３３ａを設け、これら各軸受部３２ａ，３３ａに駆動軸４を軸受支持して、該駆動軸４の上端を前記モータ２に連結する一方、該駆動軸４の偏心部４１にローラ３４を挿嵌している。

【００１３】また、前記シリンダ３１には、低圧のガス冷媒をシリンダ室３１ａに吸入する吸入孔３１ｂを設けると共に、前記ローラ３４に先端部が接触して、進退可能に摺動するブレード３５を内装して、前記フロントヘッド３２には、圧縮ガス冷媒が吐出する吐出孔（図示せず）を設けると共に、吐出マフラー５を取付けて、該吐出マフラー５により吐出チャンバー５１を形成し、前記モータ２の回転駆動に伴う前記ローラ３４の回転により前記吸入孔３１ｂから前記シリンダ室３１ａ内に低圧のガス冷媒を吸入し、この吸入したガス冷媒を前記ローラ３４の回転によって圧縮し、圧縮したガス冷媒を、前記吐出孔から前記吐出チャンバー５１内に吐出させるのであって、該吐出チャンバー５１からケーシング１内一次吐出空間６へ吐出させるようにしている。

【００１４】斯くして本発明は、以上説明したロータリー圧縮機において、前記偏心部４１に、該偏心部４１の偏心方向から該駆動軸４の反回転方向に９０°変位した位置を中心として、両回転方向にそれぞれ少なくとも９０°の範囲内において、前記偏心部４１の前記ローラ３

４内周面と摺動する摺動面４２の軸方向幅を縮小させる縮小摺動部４３を形成したのである。

【００１５】即ち、前記駆動軸４の回転時において、前記偏心部４１の前記ローラ３４との摺動面４２が圧縮された冷媒ガスや前記ブレード３５の圧接などにより荷重を受ける摺動部のうち、荷重が最大となるときの荷重量の多い側に対して反負荷側となる摺動面４２の軸方向幅を縮小させて縮小摺動部４３を形成するのである。つまり、この前記偏心部４１の摺動面４２が受ける荷重は、図４に太線矢印で示したように偏心部４１の回転角度によりその荷重の大きさと方向が異なるのであって、図４では、前記シリンダ室３１ａ内における前記偏心部４１が、該偏心部４１の偏心方向が前記ブレード３５の先端部を始点として４５°ずつ回転移動したときのそれぞれの荷重の大きさ及び方向を矢印の長さと方向により示している。従って、この図４より明らかなとおり、偏心部４１の偏心方向位置がブレード３５に対向している位置を基準とし、この位置を０°とした場合、この０°から９０°において前記摺動面４２が荷重を受けるのは、偏心方向位置と、この偏心方向位置に対し反回転方向に９０°を越えた位置との範囲であるが、この範囲では、吸入段階及び圧縮工程が開始されたばかりなので該偏心部４１の摺動面４２の受ける荷重は小さい。また、９０°から１８０°において、荷重を受ける摺動面４２は、偏心方向に対し反回転方向の９０°位置から、偏心方向位置に対し１８０度位相がずれている反偏心方向位置を経て、偏心方向に対し回転方向位置に変わり、荷重も圧縮の進行と共に増大するのである。そして、２２５°の位置、つまり、吐出弁が開き吐出が開始される直前で荷重は最大となり、この荷重が、前記摺動面４２における偏心方向から回転方向に９０°変位した位置を中心に作用することになるのである。

【００１６】斯くして本発明は、以上のように前記偏心部４１の摺動面４２の受ける荷重の大きさがその回転位置で異なることに注目し、荷重の小さい領域において、摺動面４２の面積を小さくしたものである。

【００１７】具体的には、図２及び図３に示すように、前記偏心部４１の偏心方向を矢印Ａで示すと、この偏心方向Ａから、前記駆動軸４の回転方向に９０°変位した位置が、荷重が最大となったときの負荷側位置となり、逆に反回転方向に９０°変位した位置ａを中心として、両回転方向にそれぞれ少なくとも９０°の範囲が荷重が最大となったときの反負荷側となるのである。従って、この範囲内において、前記偏心部４１の軸方向両端部に三日月状の段部４３ａ，４３ａを形成し、前記偏心部４１の軸方向中央位置に、即ち、前記ローラ３４への挿嵌時に該ローラ３４の軸方向中央位置に対向するように、前記摺動面４２を軸方向幅に縮小させる前記縮小摺動部４３を形成したのである。

【００１８】斯くすることにより、前記駆動軸４の回転

時において、該駆動軸４の偏心部４１の摺動面４２の荷重量が最大となるときの負荷側においては、この荷重に耐えうるだけの十分な摺動面積を確保して、この荷重量の多い摺動面４２と前記ローラ３４の内周面との間の油膜厚を十分確保できるので、この摺動による摩耗、焼付けを防止できるし、しかも、摩耗、焼き付けの影響の少ない前記摺動面４２の荷重量の少ない反負荷側において、前記縮小摺動部４３を形成することにより、前記摺動面積を縮小させて、前記摺動面４２と前記ローラ３４の内周面との摺動面における油の粘性せん断損失を小さくできるので、全体として前記駆動軸４の回転時の、機械損失も低減できながら、潤滑不良による問題も解消できるのである。

【００１９】以上のように、本発明のロータリー圧縮機は、前記偏心部４１の摺動面４２における荷重量が最大となるときの負荷側においては前記偏心部４１の摺動面４２の面積を確保して油膜厚が薄くなることによる前記ローラ３４の内周面との間の潤滑不良を防止して、潤滑不良による摩耗、焼付けを防止できながら、しかも、荷重量が最大となるときの反負荷側に前記縮小摺動部４３を設け、この反負荷側での摺動面積を縮小させることにより、前記摺動面４２と前記ローラ３４の内周面との摺動面における油の粘性せん断損失を小さくしたので、潤滑不良が生ずることなく、前記駆動軸４の回転時の、機械損失も低減できるのである。

【００２０】また、前記実施例においては、前記縮小摺動部４３を前記ローラ３４への挿嵌時に該ローラあうの中央位置に対向するように、前記摺動面４２の軸方向中央部に位置させているので、前記ローラ３４に挿嵌してもガタツキが生じないし、前記偏心部４１の外径を測定する際、前記縮小摺動部４３を形成していても、その測定ポイントを軸方向中央にできるので、前記摺動面４２が形成の誤差の範囲で傾斜している場合、最小径と最大径のほぼ平均値を測定できることになるので、最大径と測定値との誤差を小さく抑えることができ、性能、信頼性を従来通り維持できるのである。尚、前記縮小摺動部４３の形成位置は、軸方向中央部が好ましいが、この中央部に限らず、任意の位置に形成してよい。

【００２１】次に、前記縮小接触部４３の他の実施例について図５及び図６に基づいて説明する。図５は、前記偏心部４２に形成する前記縮小摺動部４３を正面からみた図で、図６は、図５の縮小摺動部４３をＸ方向からみた図であり、本実施例は、前記縮小摺動部４３を、その軸方向幅が、偏心方向から前記駆動軸４の反回転方向に９０°変位した位置、つまり図２に示したａ位置に向かって順次狭く形成したものであって、該ａ位置における軸方向幅が最小幅になるように形成するのである。具体的には、前記縮小摺動部４３を形成するために、前記偏心部４２に段部４３ａを形成するのであるが、この段部４３ａを形成した後に面取りする場合、前記縮小摺動部

４３の軸方向両端部に前記ａ位置において最小幅となるように面取りして前記縮小摺動部４３の中心部（前記したａ位置）における軸方向幅が最小となるように形成するのである。斯くすることにより、前記摺動面４２における荷重量が最大となるときの反負荷側、即ち前記ａ位置に向けて順次摺動面積を縮小していくことができるので、前記偏心部４１の油にる粘性せん断損失をより効果的に低減できるのである。さらに、前記縮小摺動部４３におけるこの最小幅部で受ける荷重は、図４に示した４５°近くの角度範囲において荷重の負荷側となり、荷重量は比較的小さいが、摺動面積が小さくなることにより油膜厚が減少して潤滑不足が生じやすくなるのであるが、前記縮小摺動部４３を前記した順次幅狭にする形状にしているので、前記縮小摺動部４３の最小幅となる中心部に、この幅狭形状により生ずる傾斜面に沿って油を集中させることができるので、この摺動部に十分な給油を行えるのであって、この部分における油不足を防止でき、それだけ信頼性を向上できるのである。また、前記傾斜面は面取り加工により加工しているので、その形成が容易であるし、また、様々な軸受負荷に対応して軸方向幅を自由に設定できるのである。

【００２２】

【発明の効果】本発明のロータリー圧縮機は、前記偏心部４１に、該偏心部４１の偏心方向から該駆動軸４の反回転方向に９０°変位した位置を中心として、両回転方向にそれぞれ少なくとも９０°の範囲内において、前記偏心部４１の前記ローラ３４内周面と摺動する摺動面４２の軸方向幅を縮小させる縮小摺動部４３を形成したから、前記駆動軸４の回転時において、該駆動軸４の偏心部４１の摺動面４２における荷重量が最大となるときの負荷側においては、この荷重に耐えうるだけの十分な摺動面積を確保して、この荷重量の多い摺動面４２と前記ローラ３４の内周面との間の油膜厚を十分確保できるので、この摺動による摩耗、焼付けを防止できるし、しかも、前記摺動面４２における荷重量が最大となるときの反負荷側においては前記縮小摺動部４３により、前記摺動面積を縮小させて、前記摺動面４２と前記ローラ３４の内周面との摺動面における油の粘性せん断損失を小さくできるので、前記駆動軸４の回転時における、機械損失を潤滑不良の問題が生ずることなく低減できるのである。

【００２３】また、偏心部４１の摺動面４２における縮小摺動部４３を、前記偏心部４１の前記ローラ３４への挿嵌時に、該ローラ３４の軸方向中央位置に位置するように形成することにより、前記ローラ３４に前記偏心部４１を挿嵌してもガタツキが生じないし、該偏心部４１の外径を測定する際、前記縮小摺動部４３を形成していても、その測定ポイントを軸方向中央にできるので、前記摺動面４２が形成の誤差の範囲で傾斜している場合、最小径と最大径のほぼ平均値を測定できることになるの

で、最大径と測定値との誤差を小さく抑えることができ、性能、信頼性を従来通り維持できるのである。

【００２４】また、偏心部４１の摺動面４２における縮小摺動部４３を、その軸方向幅が偏心方向から駆動軸４の反回転方向に９０°変位した位置に向かって順次狭く形成することにより、この偏心部４１の軸方向端部に前記縮小摺動部４３の中心部に向かって傾斜する傾斜面を形成でき、該縮小摺動部４３の最小幅の部分にこの傾斜面に沿って油を集中させることができるので、前記縮小摺動部４３において摺動面４２の面積が小さくなり、圧縮工程の開始時前後においてこの縮小摺動部４３に負荷が掛かって油膜厚が薄くなって油不足が生じ易くなっても、この摺動部に十分な給油ができ、この部分における油不足を防止でき、信頼性を向上できるのである。

【図面の簡単な説明】

【図１】本発明のロータリー圧縮機の縦断面図。

【図２】本発明のロータリー圧縮機におけるシリンダの拡大横断面図。

＊【図３】本発明における駆動軸の偏心部の斜視図。

【図４】シリンダ内における駆動軸の偏心部に掛かる荷重の作用説明図。

【図５】他の実施例を示す偏心部の拡大正面図。

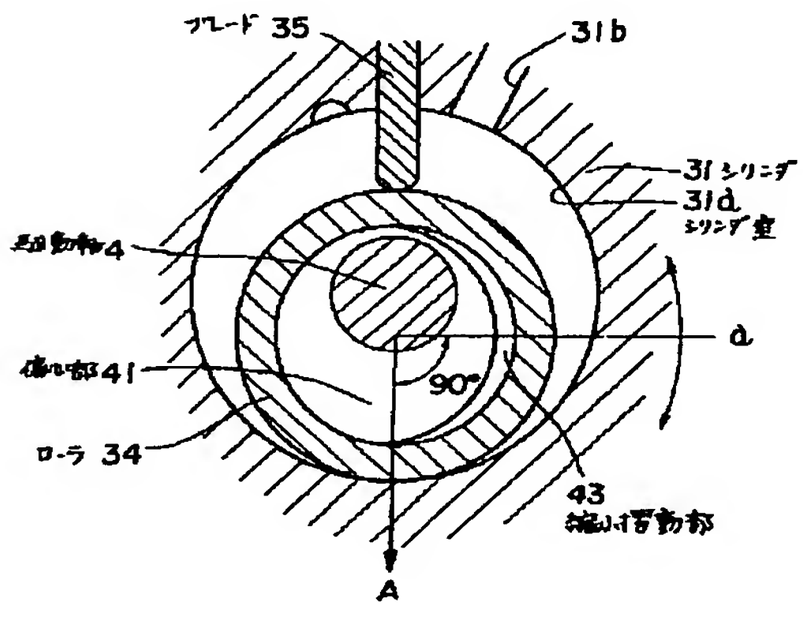
【図６】図５の偏心部をＸ方向からみた拡大側面図。

【図７】従来例を示す断面図。

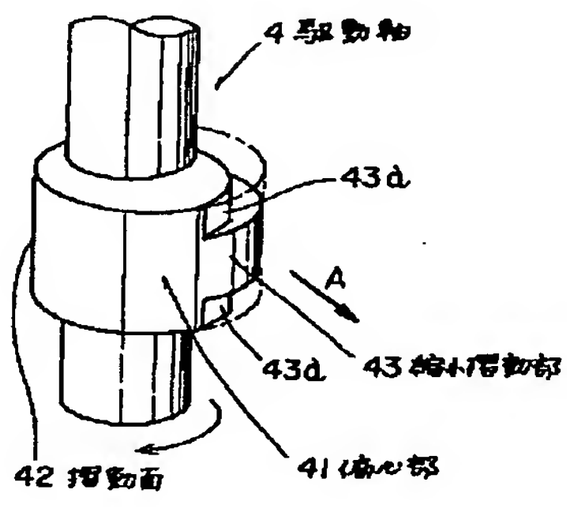
【符号の説明】

２　　モータ
３　　圧縮要素
３１　シリンダ
３１ａ　シリンダ室
３２　フロントヘッド
３３　リヤヘッド
３４　ローラ
４　　駆動軸
４１　偏心部
４２　摺動面
＊　４３　縮小摺動部

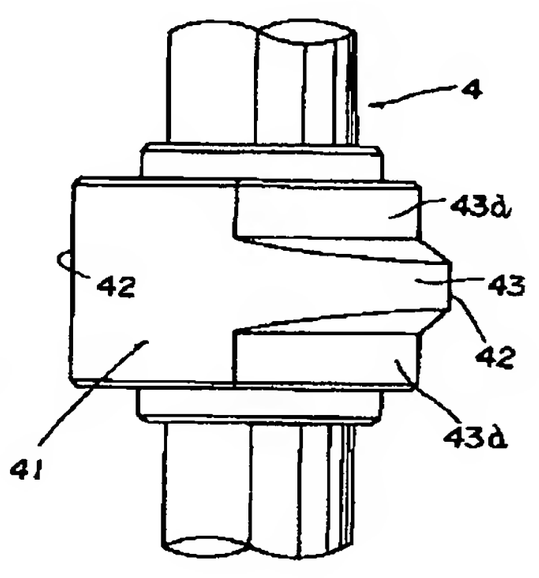
【図２】



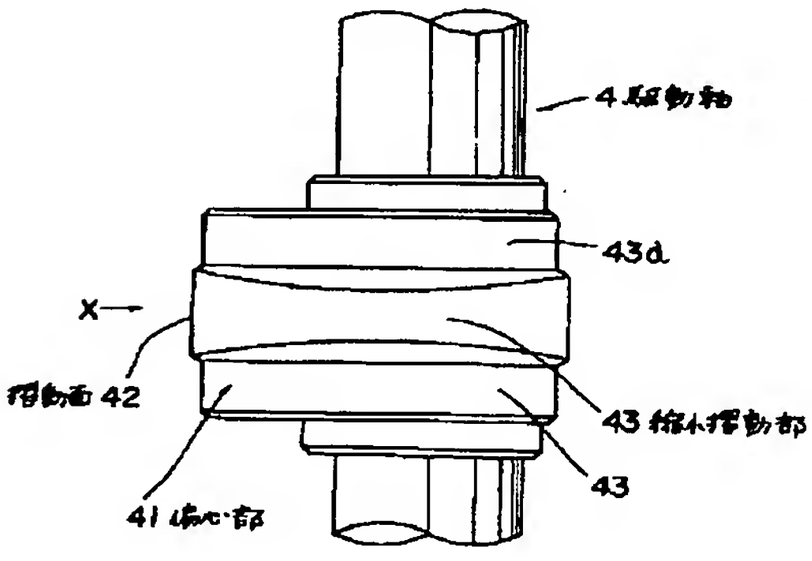
【図３】



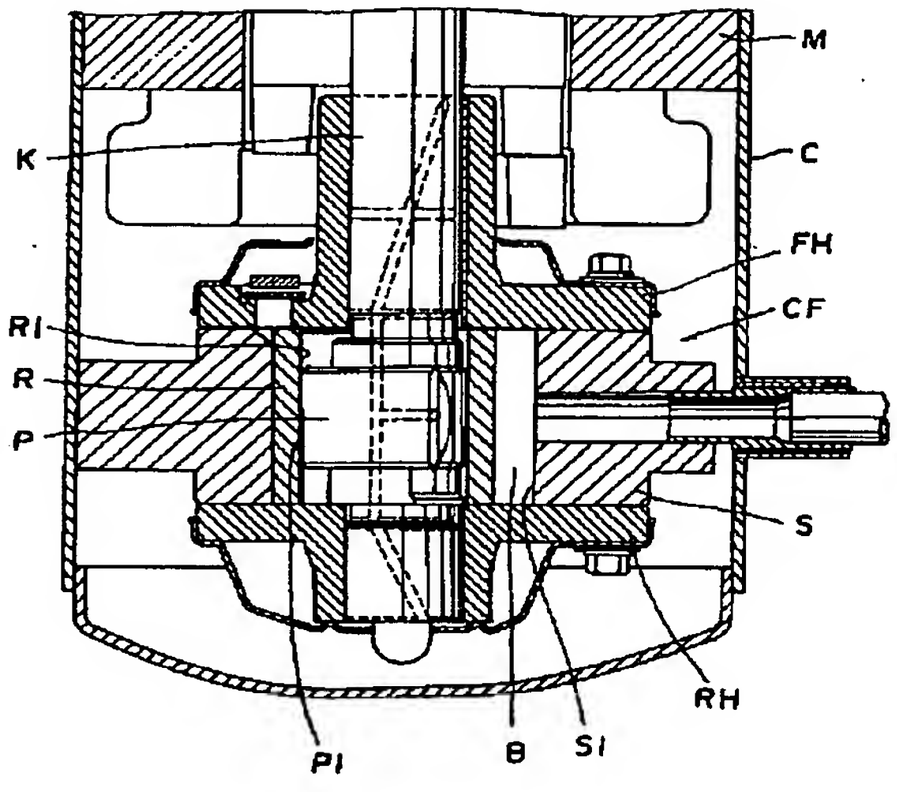
【図６】



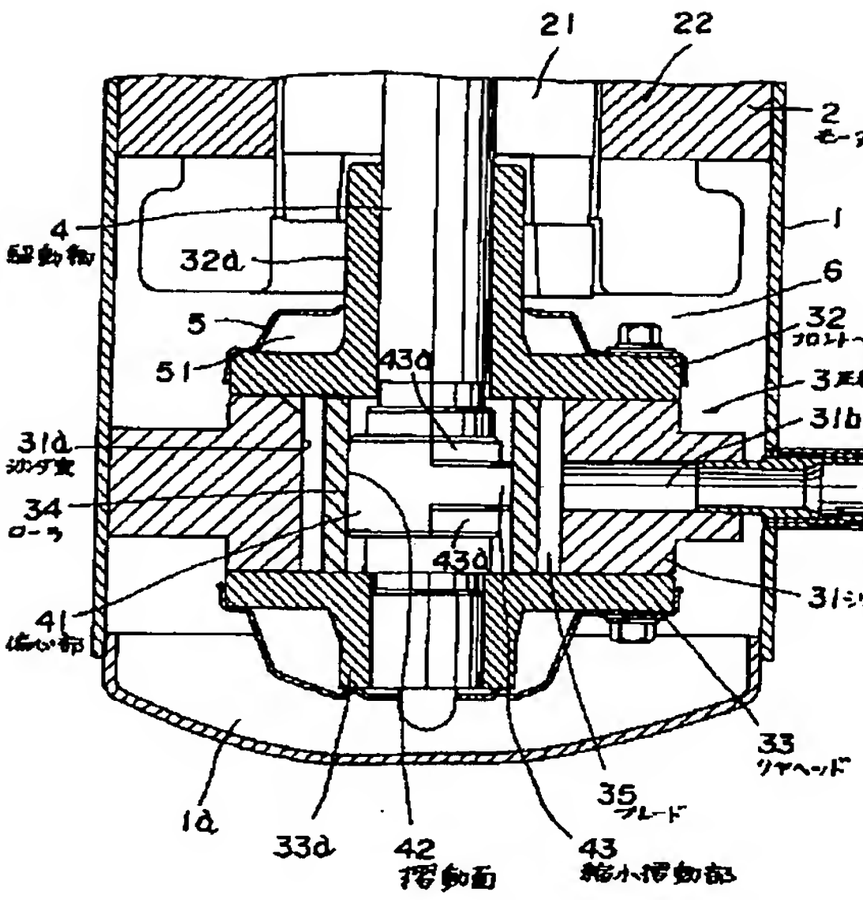
【図５】



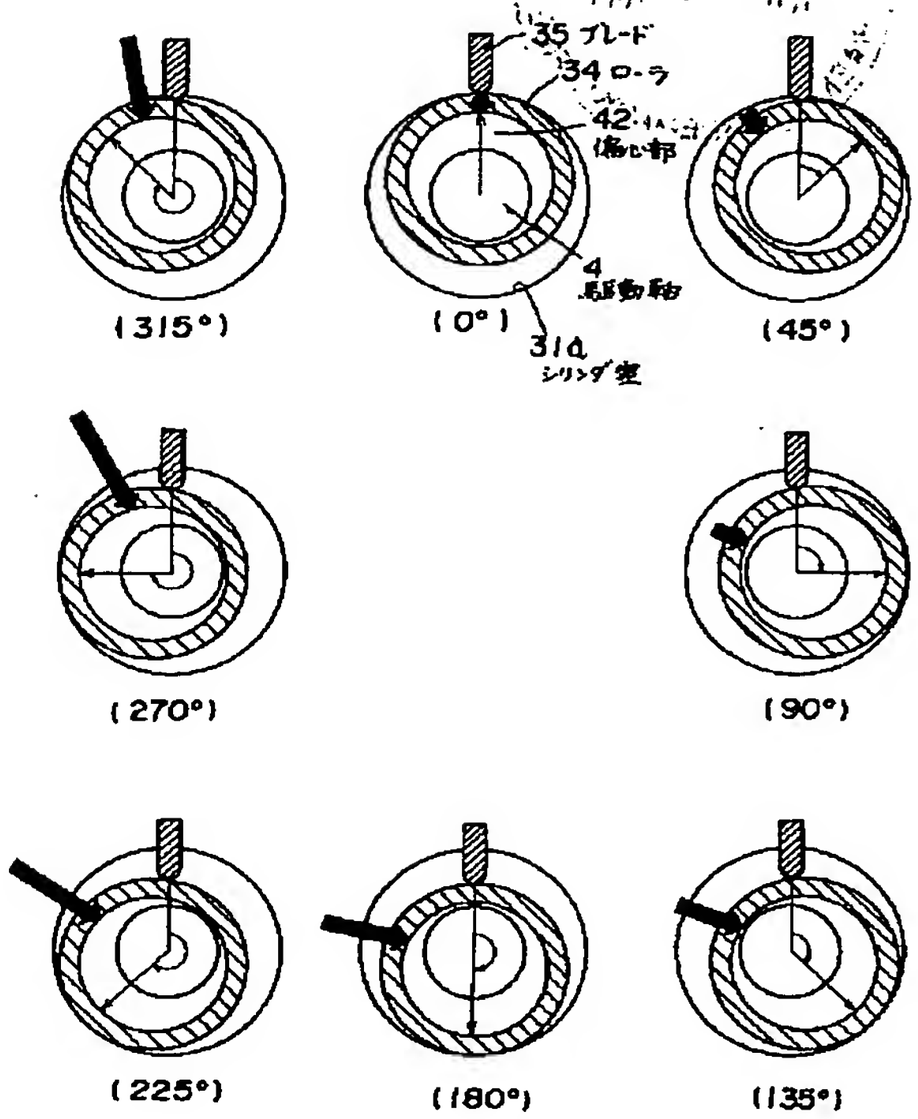
【図７】



【図１】


21
22
2
モータ
4
駆動軸
1
32d
6
5
32
フロントヘッド
51
43c
3
31b
31d
シリンダ室
34
ローラ
43d
31シリンダ
41
偏心部
33
リヤヘッド
35
ブレード
1d
33d
42
揺動面
43
縮小揺動部

【図４】


35 ブレード
34 ローラ
42
偏心部
4
駆動軸
31d
シリンダ室
(315°)
(0°)
(45°)
(270°)
(90°)
(225°)
(180°)
(135°)